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RESEARCH ARTICLE

Effect of nitrogen sources and spacing on growth and yield of baby corn (*Zea mays* L.)

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SUMMARY

A field experiment was carried out at Agricultural Research Farm of Institute of Agricultural Sciences, BHU, Varanasi to study the response of nitrogen sources and spacing on growth and yield of baby corn during the pre- *Kharif* season of 2008 and 2009.The results clearly revealed that 75% N through urea + 25% N through FYM (N_2) and spacing of 40 cm × 15 cm (S_1) were found best source of nitrogen and spacing, respectively and their combination N_2S_1 (75% N through urea + 25% N through FYM + 40 cm × 15 cm spacing) emerged superior over all other treatment combinations in relation to growth, yield attribute and yield for commercial cultivation of baby corn under agro- climatic conditions of Varanasi.

Key Words : Baby corn, Nitrogen, Spacing, Yield attributes, Yield

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Baby corn, is a new economic product of maize (*Zea mays* L.) and little is known to the maize growers in India. The term "Baby corn" refers to young flowering maize cob harvested within 2-3 days of silk emergence. The lack of knowledge of use and economic importance of this product seems to be the major factors, besides lack of availability of production technology for popularizing its cultivation among cultivators. Maize is the principal rainy - season crop of Uttar Pradesh and keeping in view the maize production potential of the state and low economic returns from maize grain, its cultivation as baby corn can be exploited to improve the economic status of poor maize growers. Provided the suitable agro - techniques are made available. Maize is an exhaustive crop and requires heavy application of nitrogen along with phosphorus and potassium. The importance of nutrient supply (N, P and K) in maize is further aggravated when it is grown for baby corn production because of high plant density and extremely short duration of crop (Pandey *et al.*, 2000). Low response of crop to added fertilizers and declining factors productivity were noted under prevalent cropping system due to deterioration in physical, chemical and biological quality of soil (Harris and Bezdick, 1991) and much higher annual removal of nutrients by crops and cropping systems were noted than the amount added through fertilizers and resulted negative nutrient balance (Singh, 2006). The integrated nutrient supply including organic (FYM) and inorganic fertilizers improved the productivity of major cropping systems along with maintaining better soil quality on cost effective basis (Rao *et al.*, 2009). Crop geometry is one of the important factors which have to be maintained at optimum level to harvest maximum solar radiation and utilize the soil resources effectively. Hence, the present investigation was undertaken to find out the response of nitrogen sources and spacing on growth and yield of baby corn (*Zea mays* L.) under Varanasi condition of eastern Uttar Pradesh.

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MATERIALS AND METHODS

A field experiment was conducted during the pre - *Kharif* season of 2008 and 2009 at Agricultural Research farm,

Department of Agronomy, Institute of Agricultural sciences, Banaras Hindu University, Varanasi. The experiment was laid out in randomized block design (4×2 factorial). Comprising combination of four sources of nitrogen N_1 (100% N through urea), N_2 (75% N through urea + 25% N through FYM), N_3 (50% N through urea + 50% N through FYM) and N_4 (25% N through urea + 75% N through FYM) and two row spacing S_1 (40cm × 15cm), S_2 (30 cm × 15cm) making eight treatment combinations each replicated three times. The soil of the experimental plot was sandy clay loam in texture, neutral in reaction (pH 7.4), low in available nitrogen (182 kg/ha), medium in available phosphorus (13.86 kg/ha) and available potassium (260.45 kg/ha). Variety Malviya Makka-2 was sown on 12th May and 14th May during 2008 and 2009, respectively. Farm yard manure (FYM) was used as an organic source of nitrogen and applied on the basis of nitrogen content in its dry weight as per treatment. Full dose of FYM, phosphorus, potash and half dose of nitrogen (as per treatment) were applied at the time of sowing by side dressing as basal application. However, the remaining dose of nitrogen was top- dressed at 25 DAS stages of the crop .The crop was raised under irrigated conditions with the application of 5 irrigations each year. All the intercultural operations were carried out as per requirements of the treatments. The immature cobs (baby corn) were harvested at 2-3 days of silk emergence stage and marketed as fresh after dehusking. The crop was harvested as green fodder after the competition of cob picking.

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads:

Growth attributes :

The various growth and physiological characters of baby corn were significantly influenced by different nitrogen sources and spacing (Table 1). Among the various combinations of organic and inorganic sources of nitrogen, 75% N through urea + 25% N through FYM was more effective in producing taller plants with higher leaves/plant, leaf area and leaf area index. This might have been possible due to abundant nitrogen supply and its availability through organic and inorganic source which helped the baby corn plants to attain more vigour in terms of all the growth attributes**.** Saha and Mondal (2006) were also of same opinion. Among the various combinations of organic and inorganic sources of

Table 1: Effect of sources of nitrogen (N) and spacing (S) on growth attributes (45 DAS) in baby corn (pooled data of 2 years)

Treatments	Plant height	Leaves /plant	Leaf area(cm^2)	Leaf area index	Dry weight/ plant (g)
Sources of nitrogen (N)					
N_1	148.95	16.62	3710.15	2.70	107.05
N_2	155.57	17.56	3802.87	2.84	109.91
N_3	137.12	16.20	3511.99	2.59	92.98
N_4	130.82	14.20	3242.19	2.36	90.49
CD(P=0.05)	1.27	0.30	63.22	0.06	3.02
Spacing (S)					
S_1	155.30	17.67	3835.08	2.87	110.63
S_2	130.93	14.62	3298.52	2.37	89.59
CD(P=0.05)	0.90	0.21	44.70	0.04	2.13

Table 2: Effect of sources of nitrogen (N) and spacing (S) on yield attributes and yield of baby corn (pooled data of 2 years)

Treatments	Cob length (cm)	Cob girth (cm)	Cob weight with husk (g)	Cob weight without husk (g)	Cob yield (q/ha)	Forage yield (q/ha)
Sources of nitrogen (N)						
N_1	6.19	2.06	44.36	6.90	24.48	118.32
N_2	6.33	2.31	46.13	7.31	26.45	125.61
N_3	6.09	1.91	43.68	6.70	23.38	114.83
N_4	5.77	1.58	40.16	6.25	20.98	103.03
CD(P=0.05)	0.07	0.09	0.48	0.15	0.58	1.83
Spacing (S)						
S_1	6.33	2.43	45.71	7.27	27.30	144.38
S_2	5.86	1.50	41.45	6.31	20.33	86.51
CD(P=0.05)	0.05	0.06	0.34	0.11	0.41	1.29

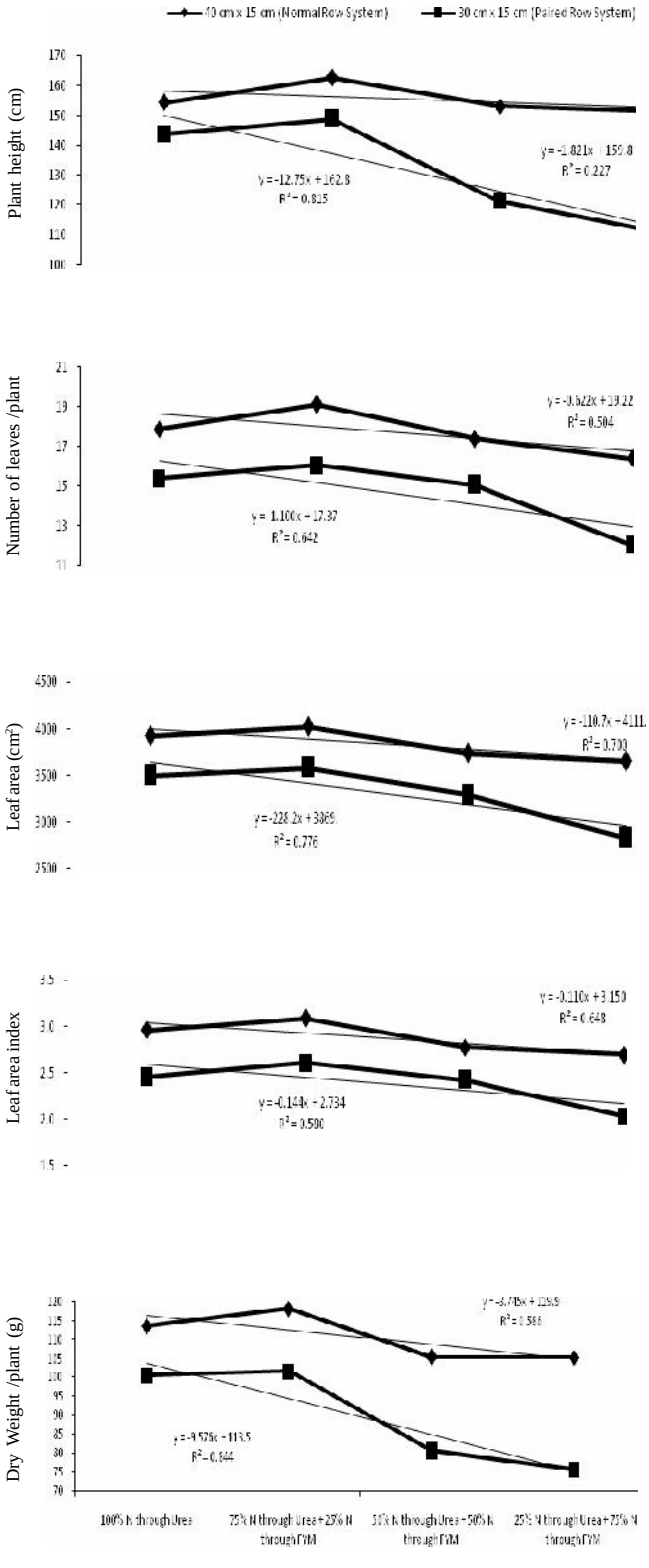

Fig. 1 : Interaction effect as influence by sources of nitrogen (N) and spacing (S) on growth attributes(45 DAS) in baby corn (pooled data of 2 years)

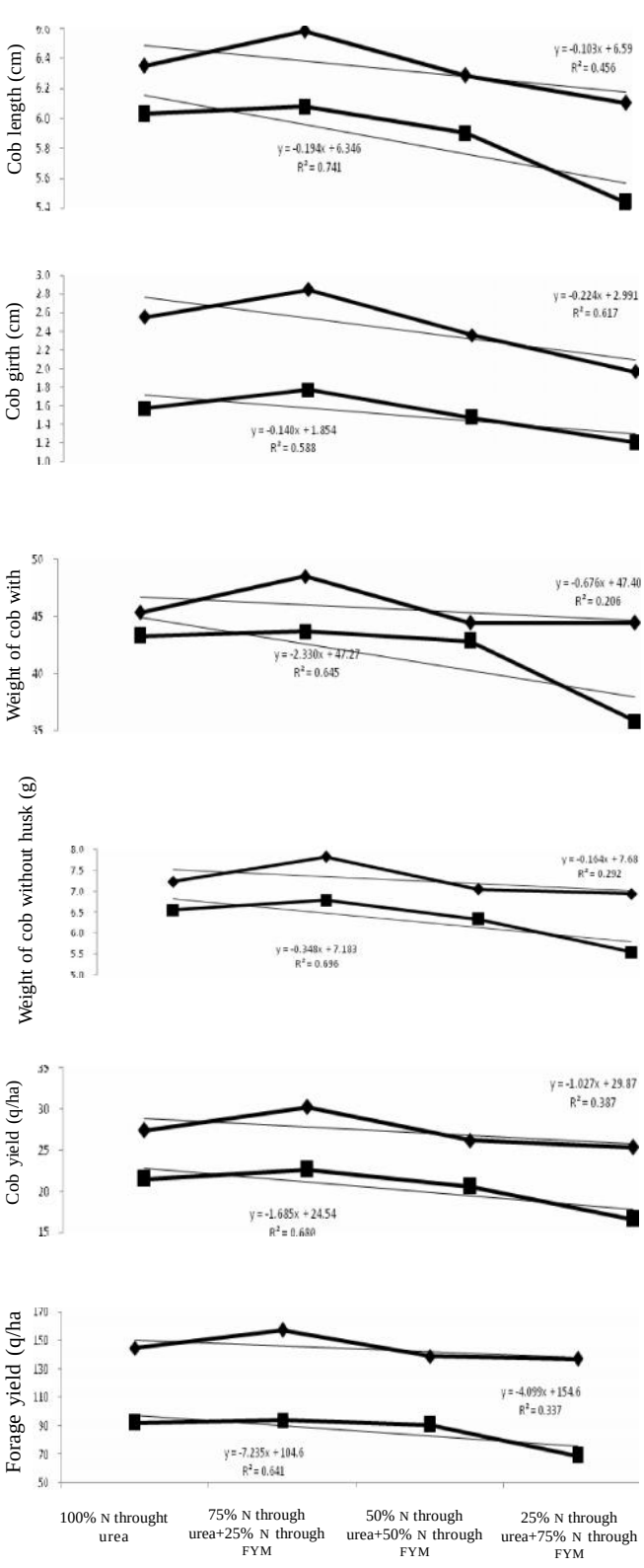

Fig. 2: Interaction effect as influence by sources of nitrogen (N) and spacing (S) on yield and yield attributes in baby corn (pooled data of 2 years)

nitrogen, N_2 (75% through urea + 25% through FYM) was more effective in producing higher dry weight of plant, which was statistically at par with N_1 (100% N through urea). Greater exposure to light leading to better photosynthetic activity and increased availability of nutrients to plants provided more vigour to the plants in becoming healthier, which in turn resulted in higher dry weight of plant. The results reported by Kumar (2009) in their experiments, are in close conformity with these findings. Due to wider spacing (40 cm x 15 cm), greater exposure to light leading to better photosynthetic activity and increased availability of nutrients to plants resulted in higher growth attributes and physiological characters of experimental crop. These findings are in close conformity to those reported by Kumar *et al*. (2005).

The interaction effect among nitrogen sources and spacing was also found to be significant. Out of the eight combinations of organic and inorganic sources of nitrogen and spacing, $N_2 S_1$ (75% N through urea + 25% N through FYM + 40 cm x 15 cm spacing) maintained its superiority over all other treatment combinations in relation to growth and physiological characters of baby corn under the agro-climatic condition of Varanasi (Fig. 1).

Yield attributes and yield :

It is evident from the data (Table 2) that outstanding influence of sole inorganic sources of nitrogen application (100 % through urea) as well as integrated approach of nitrogen application (75 % through urea + 25 % through FYM) caused spectacular improvement in all growth characters of the crop, consequently plants of the crop attained profound growth and become capable to produce full expression of the yield attributes and yield of baby corn. Higher cob length, cob girth, cob weight with husk and cob weight without husk and finally the cob yield and forage yield was found to be higher when the crop was supplied with 75% N through urea + 25% N through FYM. Wider row spacing of 40 cm x 15 cm also resulted in same outcome in term of yield attributes and yield. These results are also in conformity with the results of the investigation carried out by Kumar and Ghosh (2003).

75% N through urea + 25% N through FYM, 40 cm x 15 cm spacing and their interaction were more effective in producing better yield attributes and yield (Fig. 2) over rest of the treatment combinations. This might be attributable to plants in the plots with wider spacing attained more vigour due to availability of more light as well as adequate nitrogen supply, and as such, produced longer cobs with higher girth and weight resulting better yield.

It was concluded that for commercial cultivation of baby corn under agro- climatic conditions of Varanasi, integration of total nitrogen in the form of 75% N through urea + 25% N through FYM and spacing of 40 cm × 15 cm were found best source of nitrogen and spacing in relation to growth, yield attributes and yield of baby corn.

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